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(56) Documents Cited

US 4974645 A

US 4501374 A

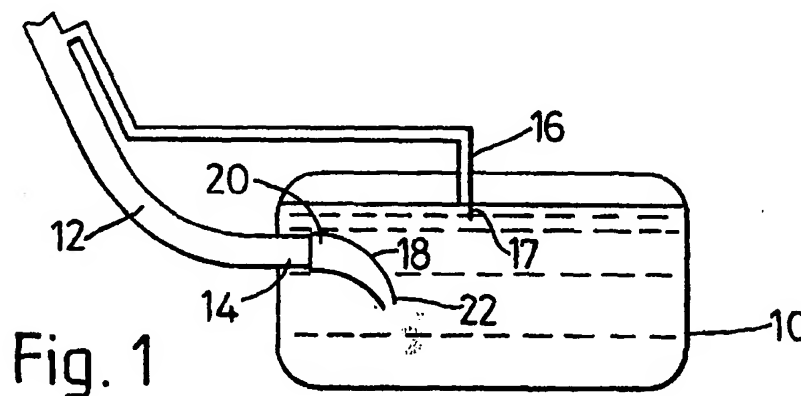
(58) Field of Search

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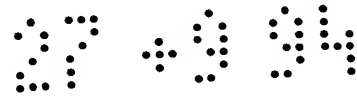
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(54) Tank filler duct

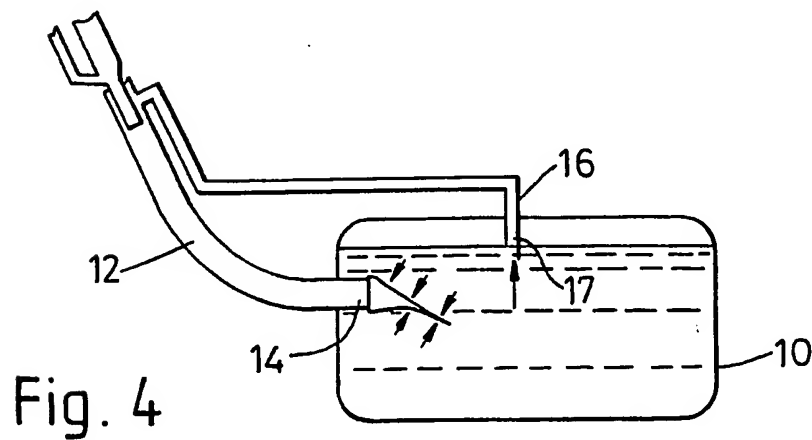
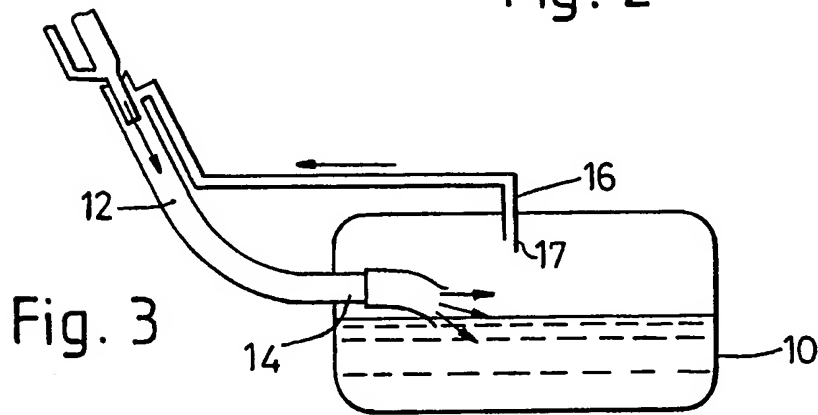
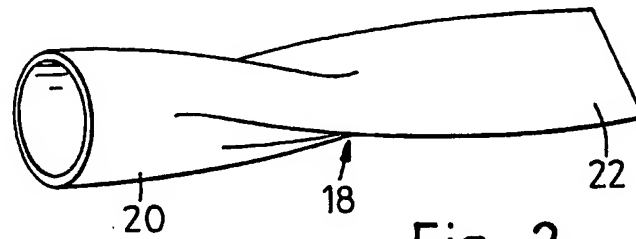
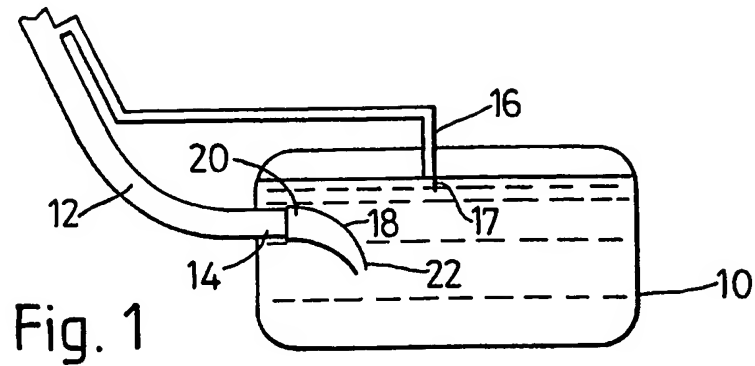
(57) A fuel tank 10 has a filler duct 12 with a non-return valve comprising a flexible tubular member 18 which hangs down from the lower end of the filler duct into the tank. When there is pressure in the tank tending to force fuel back up the filler duct 12, eg just after the filler gun has been shut off, that pressure closes the lower end 22 of the flexible tubular member 18 and prevents any return flow of fuel up the filler duct 12. A breather pipe 16 leads from the top of the tank to a point near the top of the filler duct. The tubular member 18 may be of flexible plastics material.



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**2283011**A Tank Filler System

The present invention relates to filler systems for tanks and is particularly useful in a fuel tanks for vehicles.

Tank and filler systems, such as those for fuel, which have a filler duct opening into the tank for introducing liquid and a vapour breather duct leading from the tank back to a point on the filler duct remote from the tank, sometimes include some kind of non-return valve, such as a flap valve or ball valve, in the filler duct to prevent liquid from flowing back up the filler duct out of the tank.

The present invention provides a tank and filler system comprising a tank, a filler duct opening into the tank for introducing liquid into the tank and a breather duct leading from the tank to allow air to escape from the tank during filling, and a non-return valve for preventing liquid from flowing back up the filler duct out of the tank, wherein the non-return valve comprises a flexible tubular member attached at one end to the filler duct and having the other free end extending towards or into the tank.

This arrangement is cheap and simple to make and reliable.

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Preferably the tubular member is attached to the end of the filler duct leading to the tank.

Preferably the tubular member is arranged such that it can hang down from the end of the filler duct and its free end is below the level of the filler duct. This is so that , provided there is sufficient fuel in the tank, the end of the tubular member is below the level of the fuel in the tank.

Preferably the tubular member is shaped such that its free end tends towards a closed or flat position.

Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 shows a tank and filler system according to the invention in which the tank is filled with liquid,

Figure 2 shows the flexible member forming a non-return valve in the embodiment of Figure 1,

Figure 3 shows the tank and filler system of Figure 1 during filling, and

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Figure 4 shows the tank and filler system of Figure 1 at the moment when the liquid supply to the filler duct is cut off.

Referring to Fig 1, a vehicle fuel tank 10 has a filler duct 12 with its lower end 14 passing through the side of the tank and opening into the tank, and having its upper end open to receive the nozzle of a filler gun. A breather pipe 16 leads from the top of the tank, where its lower end 17 extends downwards into the tank, to a point near the upper end of the filler duct. A flexible tubular member 18 has a first end 20 attached to the lower end of the filler duct 12 and a second end 22 hanging freely inside the tank so that it is below the lower end of the filler duct 12.

The tubular member is formed flexible plastics material and is shaped as shown in Figure 2, its first end being substantially circular in cross section so as to fit with the filler duct 12, and its second end being generally flat so that it naturally adopts a closed position as shown in Figure 2. However, as it is of flexible material, the second end opens out as fuel flows through it.

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Referring to Figure 2, as the tank 10 is being filled fuel

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flows down the filler duct 12 and into the tank through the flexible tubular member 18, while air escapes from the tank by flowing out through the breather pipe 16. When the fuel level reaches the lower end 17 of the breather pipe 16, the filler duct 12 starts to fill with fuel. This continues until the fuel level in the filler duct 12 reaches the nozzle of the filler gun which causes the supply of fuel to be cut off. From the time when the breather pipe 16 is blocked off by the fuel the continued flow of fuel into the tank increases the pressure in the tank and also forces some fuel up the breather pipe. Therefore, when the fuel supply is cut off, there is a tendency for fuel to be forced back up the filler duct 12. This can cause fuel to be expelled out of the filler duct 12. However, as shown in Figure 3, the pressure of the fuel in the tank tends to close the flexible tubular member 18 which acts as a non-return valve and the reverse flow of fuel up the filler duct 12 is therefore cut off, allowing fuel to flow up the breather pipe 16 in a more controlled manner.

Because the flexible member 18 hangs down its second end 22 will be immersed in fuel even when the level of fuel in the tank is quite low. This prevents air from escaping back up the filler duct 12.

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### Claims

1. A tank and filler system comprising a tank, a filler duct opening into the tank for introducing liquid into the tank and a breather duct leading from the tank to allow air to escape from the tank during filling, and a non-return valve for preventing liquid from flowing back up the filler duct out of the tank, wherein the non-return valve comprises a flexible tubular member attached at one end to the filler duct and having the other free end extending towards or into the tank.
2. A system according to claim 1 wherein the tubular member is attached to the end of the filler duct leading to the tank.
3. A system according to claim 1 or claim 2 wherein the tubular member is arranged such that it can hang down from the end of the filler duct such that its free end is below the level of the filler duct.

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4. A system according to any foregoing claim wherein the tubular member is shaped such that its free end tends towards a closed or flat position.
5. A system according to any foregoing claim which forms a fuel tank and filler system for a vehicle.
6. A tank and filler system substantially as herein described with reference to the accompanying drawings.

<b>Patents Act 1977</b> <b>Examiner's report to the Comptroller under Section 17</b> <b>(The Search report)</b>	Application number GB 9321405.4
<b>Relevant Technical Fields</b>	Search Examiner LINDA HARDEN
(i) UK Cl (Ed.L)      B8T (TEFX TEFE)	Date of completion of Search 24 NOVEMBER 1993
(ii) Int Cl (Ed.5)      B60K 15/04, 15/035	
<b>Databases (see below)</b> (i) UK Patent Office collections of GB, EP, WO and US patent specifications.	Documents considered relevant following a search in respect of Claims :- 1-6
(ii)	

**Categories of documents**

<b>X:</b> Document indicating lack of novelty or of inventive step.	<b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.
<b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.	<b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.
<b>A:</b> Document indicating technological background and/or state of the art.	<b>&amp;:</b> Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
Y	US 4974645 (D J JOHNSON) see Figure 1 and column 4 lines 15-37	1-6
Y	US 4501374 (S H ROBERTSON) see Figures 1 and 2 and column 4 lines 15-37	1-6

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).